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Virtual Smartphones: Exploring the Evolution and Impact of Virtualization Technology on Mobile Devices

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ABSTRACT

With the ability to fully immerse users in a virtual environment, virtual reality (VR) has grown in popularity among consumers in recent years. Technology has grown to be one of the most significant tools for communication, which is to be expected to change how companies advertise their goods and services to prospective clients. The purpose of this study is to look at how virtual smartphones: exploring the evolution and impact of virtualization technology on mobile devices perceived usefulness and enjoyment influence customers' future intention.

Nowadays, smartphones are used in the majority of human tasks in daily life, making work easier for people. The work may involve communicating with a different business via video conferencing, emailing documents, using a Google Map to find a place, etc. We all know that smartphones are useful, but occasionally users find it difficult to use them because of a lack of resources. Less storage space, a slow processor, low battery life, etc. are some of the issues. In this work, we present VSP, or Virtual Smart Phone, which is essentially a step toward connecting the real and virtual worlds over the internet with a small projector, camera, speaker, microphone, and cloud computing technology.

Keywords: Computer; Gesture communication; Virtual smartphones; Ubiquitous; Natural hand gesture; Physical dependency; Virtual image; Remotely; Physical touch; GSM technology.

1. Introduction

Smartphones are now more common than laptops and desktop computers for ordinary work and pleasure due to their portability, connectivity, the growth of innovative sensor as well as display technology is driving the development of multi-touch and gesture-based interactions. As mobile devices get more capable, some high-resource applications—like 3D games—are created that might not work effectively on devices with lower specs. Users can use their natural hand motions to directly retrieve information. In the controlled environment, users can employ gesture- and multi-touch-based interaction to connect to the digital world. The inability of smaller mobile devices to incorporate gesture and multi-touch based interactive systems prevents them from offering the same level of user experience as full-sized gesture systems. Information is still displayed on displays and projectors because cell phones and other small mobile devices are neither gestural nor multi-touch based interactive systems. A virtual smartphone allows a user to connect to other devices over a network by replacing a physical mobile phone device with an image. Users of virtual smartphones can communicate with friends, family, and the online community [2].

The number of people using smartphones has increased significantly in recent years. Due to their portability and connection, smartphones are being used by an increasing number of people in place of laptops and desktop PCs for extended periods of time. However, as compared to traditional computers, a smart phone's physical resources—such as its central processing unit (CPU), memory, storage, and battery—are typically far more constrained. Developers of mobile applications also must take these restrictions into account. Devices have different software stacks in addition to different hardware resources. These days, there are a wide variety of mobile operating systems (OS), including Windows, iOS, and Android. Diverse device incompatibilities result in disparate

user encounters. On low-end mobile phones, some computing-intensive applications might not function as intended. Moreover, certain applications couldn't include a particular mobile operating system since the software company does not employ a mobile developer.

In contrast, virtualization has been extensively studied over time and used in the sector to handle resources more effectively. It can be difficult to oversee several PCs and servers. Virtualization enables cloud-based management of all computers while producing or upgrading new patterns is more convenient. In a similar vein, mobile customers can have a flawless experience and maintenance by using this strategy on their devices. In this work, we present the VSP virtual smartphone platform, which delivers a virtual mobile operating system to end users by utilizing thin-client computing with mobile phones. The distance between devices can be reduced by executing the operating system and applications remotely. VSP is essentially a wearable gesture information interface and computer vision-based wearable that uses natural hand motions to augment the digital information surrounding us in the physical environment [4].

Many different types of multitouch and gesture-based interactive systems have emerged in recent years thanks to advancements in sensing and display technologies. Users of these devices can engage with information directly by using their hands in natural motions and with touch. Projectors or specialized surfaces are typically used in conjunction with multi-touch interactive systems and natural hand movements, where information is displayed on a screen. In this work, we substitute a virtual multi-touch and intuitive gesture-based interaction on the user's palm—which the other user can use—for the mobile phone device. Through a network, we are able to connect with another digital device. Without relying on a specific platform, the VSP invention is connected to establishing communication and transferring data between human bodies or from digital devices to human bodies or vice versa. This operates by using touch gestures on the palm or hand of a human. There are two methods that phones can transfer data. First, it calls for voice communication without a mobile phone by utilizing GSM technology. Second, information can be sent between people or digital devices via the internet, intranet, or data services from mobile data. Palm lines and fingerprint detection are applications of palm recognition [3].

2. Related Works

Many Research prototypes, mobile device products, and multi-touch interactions have emerged recently that enable direct manipulation of user interface elements through touch and organic hand motions. The majority of these systems does not recognize or implement touch-independent gestures since they depend on the user's fingers interacting with the screen via physical touch. Within a basic portable device is a highly sophisticated technology. When we introduce connectivity, we are able to engage with technology that mostly uses computer vision-based algorithms, gesture recognition, hand-augmented reality, and more, or we can acquire instantaneous, pertinent visual information about any object we choose.

2.1. A greater sense of reality

Enhanced Reality (IR) refers to a real-time direct or indirect vision of the actual physical world, where virtual computer-generated graphics magnifies its aspects. This pertains to a broader notion of "mediated reality," wherein the perception of reality is altered by a computer, potentially to the detriment of its augmentation. Traditionally,

growth takes place in an environment that has components of significance, in real- time. Virtual smartphones overlay digital data on the real environment through the use of augmented reality principles utilizing cutting-edge infrared technology. The user can interact with and use digital information about the real environment around them. As an informational overlay over the realm of reality, artificial data about the surroundings and the things within them may be saved and retrieved. The primary augmented reality hardware elements are: display, computer, input device, and tracking. The majority of contemporary smartphones have a strong Solid-state compass, GPS, accelerometer, CPU, and camera, which makes them potential platforms.

2.2. Recognition of Gestures

The goal of the field of gesture recognition in computer science and language technology is to use mathematical algorithms to comprehend human gestures. Though they can come from any posture or bodily action, gestures typically originate from the hands or face. For the interpretation of sign language, numerous methods utilizing signals and computer vision algorithms have been developed. A richer connection between humans and machines will be made possible by gesture recognition as opposed to the outdated text user interface, often known as GUI (graphical user interface), which continues to limit much of the input keyboard. Human-machine interaction (HMI) can occur spontaneously between people thanks to gesture detection, which eliminates the need for external equipment.

2.3. Algorithms Based on Computer Vision

Computer vision is the science and technology of seeing machines. The scientific discipline of computer vision examines the theory behind artificial systems designed to extract information from images. The software tracks the user's motions using a computer vision-based algorithm. The computer vision system uses a combination of particle filtering, Hierarchical hand model based on seeing and multi-scale colour feature identification to track and recognize hand motions that operates the menu. In a multi-scale colour image hierarchy, hand motions or postures are depicted on multiple scales based on qualitative correlations with respect to scale, direction, and location characteristics. Multistage colour features are present in every image [4].

Figure 1. Gesture recognition VSP system [1]

3. Objectives

Data exchange and communication between human bodies between human beings and digital devices, or both, without the need for a platform, are the subjects of VSP inventions. The goal of this finding is to use human touch on the palm or hand to develop communication and connection between humans and digital gadgets. Initially, it uses GSM technology to enable voice connection between users when a physical cell phone is not present. Second, for data transmission between digital gadgets and people. It connects devices and people over the Internet or any other type of data server, including intranet networks [1].

4. Working

There are five primary processes in the VSP function: enabling and confirming the VSP's authenticity, placing and receiving calls, shooting images and videos, copying and pasting data, and sending information to other digital devices and VSPs.

4.1. Turning on VSP

A wearable device, a VSP can be turned on or off by the user using the power button to enable or disable the device. An icon appears on the hand of the user or palm when the VSP device is turned on, allowing them to select whether to display status (if they are logged in). If touching this symbol enables the user to log in or switch between users. Employing a variety of authentication techniques, utilizing face recognition, picture selection, fingerprint search, and palm line search features, as well as providing a login and password and making a hidden symbol or pattern. After the user successfully logs in, VSP is ready to perform a variety of tasks, including taking and making calls.

4.2. Make a call

Now, the user can talk on the phone with their loved ones and other people, after activating VSP. Use a voice recognition system or a virtual key to dial a mobile number in order to place a call. The two techniques that VSP employs to initiate a call between two users are as follows.

4.3. Make a SIM-based call

The VSP gadget using a micro-SIM (Subscriber Identity Module), calls can be placed using GSM/CDMA (Global System for Mobile Communications / Code Division Multiple Access) technology.

4.4. Make a VoIP call

VSP gadget connects to wireless networks via both mobile data and Wi-Fi (wireless fidelity) are available. VoIP (Voice over IP) is made possible for the user via the internet and intranet technologies to make calls. VoIP allows the user to make calls to other GSM and Internet VoIP devices in addition to other VSP users. When the SIM is not connected to the Internet or Intranet, calls are made using it without the user's permission nevertheless, when the user is online, a prompt prompts them to select the method of calling to someone else.

4.5. Receive a phone call

If a user chooses to use Vibrate mode when making a call from a different VSP customer or from a digital device (personal data from laptops, desktop computers, and PDAs can be supported by a physical mobile phone), the

incoming call notification will show up based on the profile that the user has chosen. Thus, the tiny vibrator uses VSP's high density projector to identify the user initiating the call behind their palm in addition to employing motor vibration to signify an incoming call. When the palm is in silent mode, the only thing visible on the back is the caller's name. Direct calls can be accepted using the VSP device's speaker and mouse. VoIP calls require both users to be connected to the Internet via Wi-Fi or mobile data.

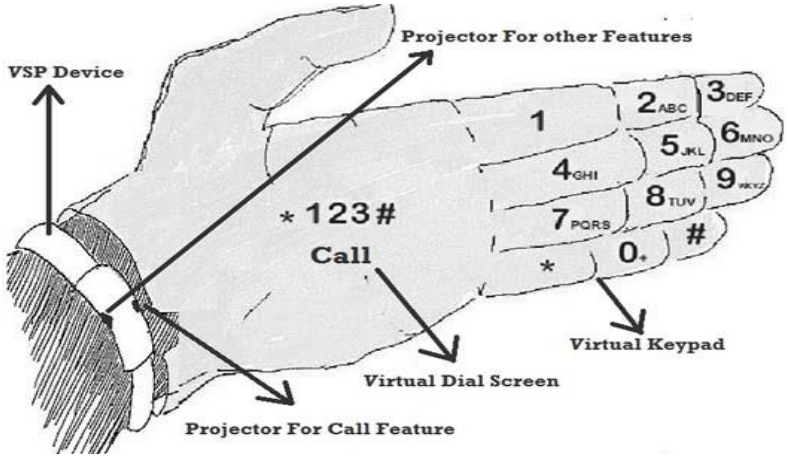

Figure 2. Panel to make a call [2]

4.6. Take a picture or video

Additionally, VSPs may record and take high-quality photographs and films with the "capture image" button on their high-quality cameras or by making famous motions with our thumb and index finger pictures. Using the VSP system, the photo appears on the user's palm after it has been taken. To record a video with the same activity, the user merely needs to convert the camera mode photo to video. Users can also use their hand motions to zoom in or out while taking pictures or videos.

4.7. Duplicate information

With just one touch motion, users of VSP can copy and copy and paste information between human bodies or from one gadget to another. In order to copy data, the user must first join in to the intranet or internet on the VSP device. VSP, which involves utilizing a VSP projector to hold more than 1.5 seconds with a finger on the user's hand, recommends copying data items and long pressing (searching through a listener software) to determine which data item needs to be duplicated, based on the capable data items. As the user receives a message that the data item is being replicated, that the data is being copied to their specific within the cloud. As an alternative, hold down the button for 1.5 seconds to copy data to the data cloud. For example, double-tap on a data item or draw a circle around it to start copying. By using this method, the user temporarily copies all cloud-stored data together with the distinct ID of each data item and copies numerous files to transfer or paste on another device [4].

5. Technologies Used

In basic terms, VSP is a wearable gadget made up of both the software and the hardware. RAM, ROM memory, and a processing unit make up the hardware of the VSP, a battery-powered power supply, sensors (such example 16 proximity sensors for touch detection on an arm plus an accelerometer), a micro vibration motor, an LED indicator

for the device's ON/OFF mode, a USB connector for connecting other devices or charging them), four mini projectors, a single HD camera for photos and videos, and pico projector-like devices, Low vigour Requires a GPS system, Four touch buttons (ON/OFF, Snap, Up, and Down), Bluetooth and WI-FI devices, and a Nano SIM card slot. The software uses computer vision-based algorithms, gesture detection systems, touch-based interface systems, and augmented reality to accomplish all of the objectives.

To make and receive calls, copy and paste data, and send data to other VSPs and digital devices, VSP uses the following technologies.

5.1. Phone Calls

In VSP, phone calls are made over the Internet via VoIP technology or via SIM cards (GSM/CDMA).

5.2. Data Transmission

When using VSP, information is sent between bodies or devices via Data Cloud. To access cloud data, a user can establish a mobile data connection with a SIM card or connect to the Internet via WI-FI [1].

6. Advantage & Disadvantage

6.1. Advantages

This program gives customers the freedom to view and utilize their personal data on their smartphone at any time, from any location, on any internet-enabled device. The app is also very safe; users will be able to create their own accounts and wear wearables, which can be very helpful because they can easily access glasses with finger sensors and quickly equip them with information instead of relying on phone devices.

6.2. Disadvantage

Even with all of the product's benefits, there are still certain drawbacks that are unavoidable. The primary drawback of these wearables is their short battery life; as of right now, they are unable to operate continuously [3].

7. Future Scope

By the use of sophisticated augmented reality, the integration of the physical and virtual worlds is achieved by gesture detection and computer vision-based algorithms. Thus, the user can communicate data to other digital devices via a virtual smart phone by using Bluetooth, WIFI, and GPS connectivity. Physical dependence on a cell phone is not necessary. In the future, this virtual smart phone will be used for virtual data exchange with different digital devices, education and training systems, news and weathercast updates, and health monitoring [3].

8. Conclusion

In essence, Virtual Smartphone is a computer-vision interface that is worn on the hand that uses hand motions to interact with digital information to enrich the actual world around us. It creates a connection between the physical and digital realms. VSP provides a straightforward way for different individuals and digital devices to communicate and transfer data. VSP Search satisfies these two needs. It is not a physical dependence on devices, to start. It also establishes a link between the real and virtual worlds.

Multiple applications of VSP include the following: (i) It is utilized in the Health Monitoring System, (ii) It is used to locate product or item information, (iii) It is used to update the weather and connect news, (iv) It is used to virtually connect several devices, and (v) It is used in the system of education and training.

Declarations

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Competing Interests Statement

The authors declare no competing financial, professional, or personal interests.

Consent for publication

The authors declare that they consented to the publication of this study.

Authors' contributions

Both the authors took part in literature review, analysis and manuscript writing equally.

Availability of data and material

All data pertaining to the research is kept in good custody by the authors.

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